Space and Missile Systems Center

Over-the-Air Distribution (OTAD) Update

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29 Apr 15

Report Documentation Page		*Form Approved* *OMB No. 0704-0188*

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1. REPORT DATE **29 APR 2015**	2. REPORT TYPE	3. DATES COVERED **00-00-2015 to 00-00-2015**

4. TITLE AND SUBTITLE **Over-the-Air Distribution (OTAD) Update**	5a. CONTRACT NUMBER
	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Air Force Space Command,Space and Missile Systems Center (SMC/GPEP),Los Angeles AFB,El Segundo,CA,90245**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES
Presented at the GPS Partnership Council 2015 (GPSPC15), held April 29 to May 1, 2015, at the Los Angeles AFB, CA.

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a REPORT **unclassified**	b ABSTRACT **unclassified**	c THIS PAGE **unclassified**	**Same as Report (SAR)**	**9**	

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std Z39-18
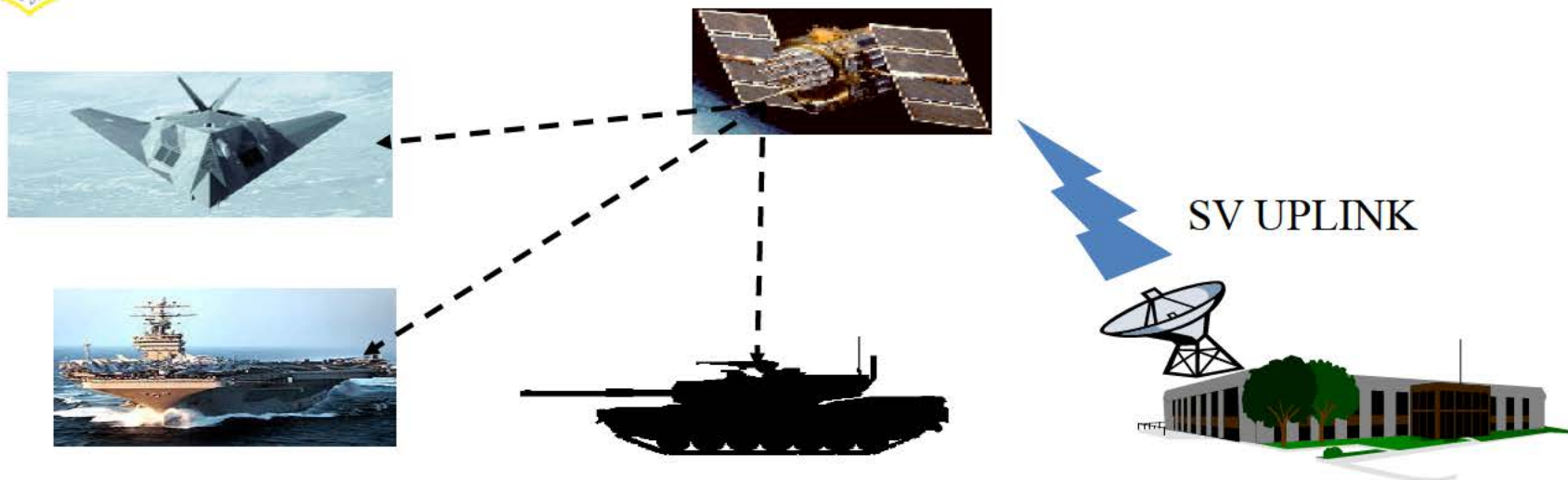
Informational Briefing

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- Summary

OTAD Overview

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SV UPLINK

- OTAD/OTAR are alternative methods of key distribution
  - OTAD Next black key sent to user via the GPS navigation message
  - OTAR Superset of OTAD key sent via the navigation message
- Receiver must be on and have a good daily key
- If receiver is off or out of keys user obtains next key from COMSEC custodian

Not all SAASM users can benefit from OTAD/OTAR

OTAR/OTAD Background

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- Many users rely on OTAD for distribution of cryptokeys
  - DAGR S/W update released to take full advantage of OTAD and mission constellation operations
  - 4+ years of successful US OTAD broadcasts

- Mission constellations allow simultaneous broadcast of multiple OTAD messages
  - The SAASM Mission Planning System (SMPS) at the JSpOC performs constellation optimization and assigns OTAR/OTAD keys to be broadcast from each SV

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# Benefits of OTAD

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- SAASM-enabled Over-The-Air cryptokey distribution provides a means to keep users keyed and protected
  - Receivers are significantly more resilient to attack when they are keyed and operating with the PPS
  - More reliable cryptography distribution for GPS PPS to coalition warfighters
  - Decreased COMSEC maintenance burden on coalition warfighters
    - Re-key time decreased to 12.5 minutes once a month with no need for paper tape, COMSEC storage, or physical touch
  - Mission constellations enables system to support US and Allied users simultaneously

OTAD/R Events

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- 2005 - 4 phases of OTAR testing
- 2009 - Transition Exercises 4 and 5 (Oct-Dec)
  - (Test Key) OTAR/OTAD capabilities were tested
- 2010 - Transition Exercise 7 (Oct-Nov)
  - On-orbit OTAD broadcast of a coalition key on all SVs for approximately 28 days
- 2011 - Start of on-orbit operational US OTAD broadcasts on all SVs continuously (Mar - present)
- 2011 - Multi-Service Operational Test & Eval (Aug)
- 2012 - AEP v5.8 deployed (Jun)
- 2013 - On-Orbit Mission Constellation Test (Feb-Mar)
- 2014 - Allied OTAD Demo
- 2014 - Block II EP IOC (Oct)
- 2015 - Allied Operational OTAD Broadcasts
- 2015 - SMPS version 5a install at JSpOC (Nov)
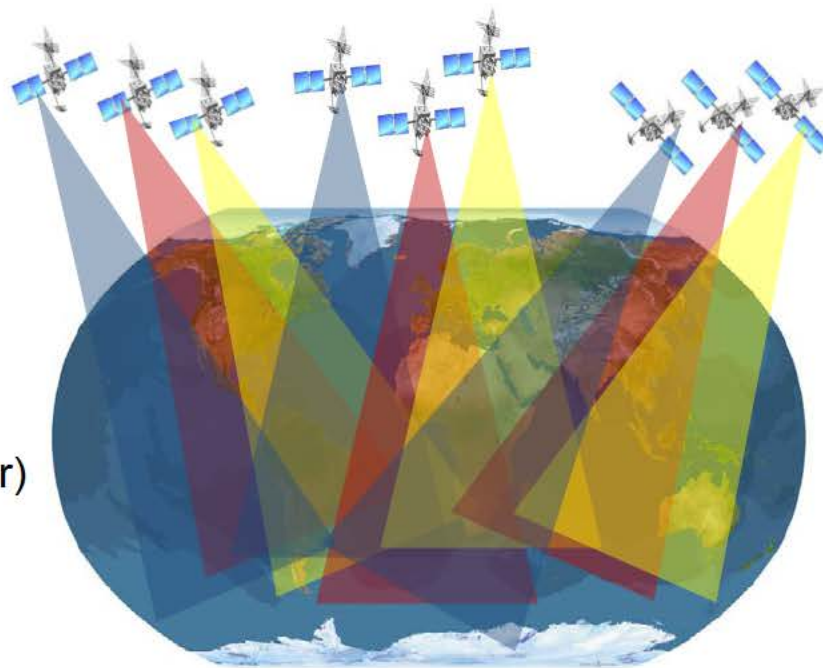
OTAD
Demonstration Overview

S P A C E   A N D   M I S S I L E   S Y S T E M S   C E N T E R
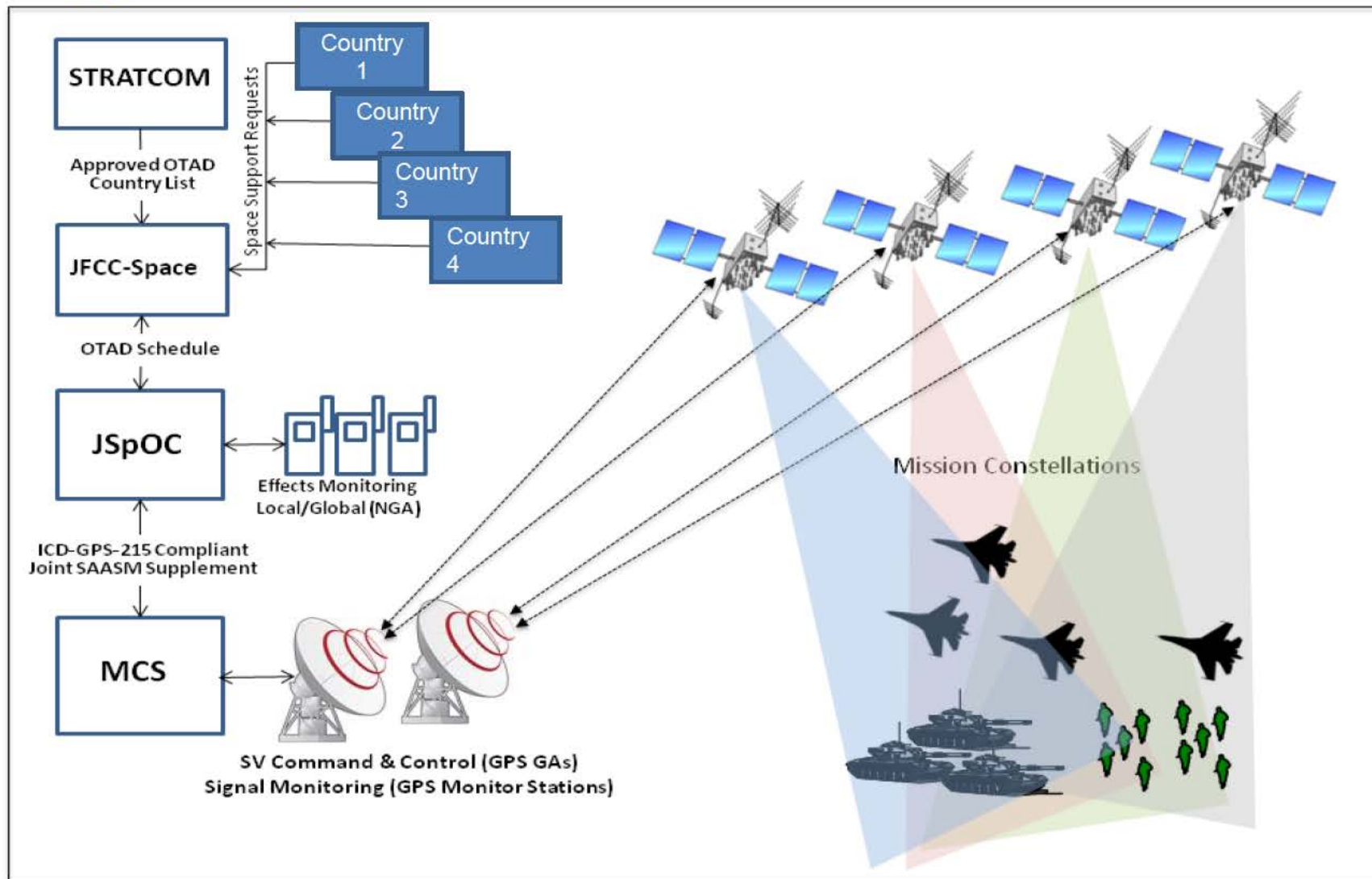
Notional OTAD Broadcast Schedule

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	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Mission Constellation 1 US OTAD	Country 1	Country 1	Country 1	Country 1	Country 1	Country 1	Country 1
Mission Constellation 2 Allied OTAD	Coalition		Country 2	Coalition		Country 2	Coalition
Mission Constellation 3 Allied OTAD	Coalition		Coalition	Coalition		Coalition	Coalition
Mission Constellation 4 OTAR Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

Keys broadcast to multiple users worldwide simultaneously

Summary

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- OTAD ensures warfighter remains keyed and protected
  - More secure and flexible cryptography
  - Reduced crypto key management burden
  - Receivers more resilient to attack
  - Mission constellations enables GPS to support US and Allied users simultaneously

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